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# FCM

SURVEY REPORT

# SOLID WASTE MANAGEMENT IN CANADIAN MUNICIPALITIES

Prepared for

The Federation of Canadian Municipalities

Wallace Associates

February, 1990

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# S U R V E Y  R E P O R T

# S O L I D  W A S T E  M A N A G E M E N T
# I N  C A N A D I A N  M U N I C I P A L I T I E S

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# SOLID WASTE MANAGEMENT IN CANADIAN MUNICIPALITIES

## 1.0 INTRODUCTION

In late 1989, the Federation of Canadian Municipalities (FCM) undertook a survey of solid waste management practices in a selected sample of their member municipalities. This survey was part of the FCM concern about environmental problems facing Canadian municipalities.

FCM member municipalities have expressed considerable interest in methods to deal with their waste management responsibilities in light of the diminishing capacity of landfill sites to accommodate the huge amounts of garbage being generated.

To assist in developing practical and effective solutions to waste management problems, FCM, with the support of Environment Canada, collected information on current municipal solid waste management practices, including future planning processes. This report summarizes the information collected.

### 1.1 Survey Sample

Approximately one-half of the 500 or so FCM member municipalities were selected to be surveyed. The criteria for selection were:

100% of municipalities with population less than 2,000
39% of municipalities with population between 2,000 and 90,000
100% of municipalities with population over 90,000.

Municipalities within the 2,000 to 90,000 population group were chosen by random selection from Canada's ten provinces and two territories.

The choice of these population-size selection percentages was designed to provide as clear a picture as possible of the waste management situation for the largest and smallest municipalities along with a reasonable working number from the large group of middle-sized municipalities.

As a result of the selection criteria and the distribution of member municipalities, approximately equally sized groups were obtained by dividing the country into five regions and the population into five groups. These divisions are shown in Table 1.

Originally 251 municipalities were chosen as the survey sample. However, due to unavoidable circumstances, the actual sample was 224. Most of the 27 excluded surveys were in Ontario and were spread about equally among the five population groups.

The surveys were mailed out in late November, 1989 and returns were

accepted for inclusion in the analysis until about January 8, 1990. Table 2 describes the total and regional return rate. The high overall average return rate of 50% indicated a keen interest in waste management issues in the FCM member municipalities. The return rates ranged from a low of 35% in Quebec to a high of 64% in the Pacific Region.

There were 113 surveys in the final survey sample. The distribution of these 113 surveys by region and population group is shown in Table 3. All population group-region cells, except the smallest population group in Quebec, have at least one survey. The totals for each region and population group are of sufficient size to conduct meaningful analyses.

## 1.2 Survey Administration

The survey included a fairly large number of questions in several categories. Because of this fact, coupled with the relatively short time for completion of the survey and the highly variable management systems in use in the different municipalities, not all questions were answered by the responding municipalities. This expected response was acknowledged in the survey design. That is, important questions were printed in bold-face type and the instructions stated that "if for any reason you are unable to answer all the questions, at a minimum, please answer those in bold-face type."

As a result of this policy, and of the variability in management systems, the results for different questions are based on variable sample sizes. Those analyses based on larger sample sizes can be expected to represent a more accurate picture than those based on smaller samples. Because of these sample size differences for different questions, the number of municipalities included in each analysis is shown in each table in this report. For the same reason, almost all analyses are presented as percents in order to facilitate comparisons.

Survey questions were grouped in the following categories:

- Background Information, including population base
- Waste Management Methods
- Types and Amounts of Waste
- Recycling System Description
- Composting System Description
- Incineration System Description
- Landfill System Description
- Future Planning

These categories included operational details on most aspects of waste management with the exception of traditional collection-landfill disposal practices. The Future Planning Category was extensive with a number of sub-categories (i.e., the planning

process, parties involved, options under consideration, approval processes, and public involvement).

## 2.0 RESULTS

### 2.1 Interpreting the Tables and Figures

Some abbreviations used in the analyses are shown in Table 1. Other specialized abbreviations are defined in various tables and graphs. In all cases, unless otherwise noted, "percent of municipalities" refers to those municipalities responding "yes" to a question as a percent of those municipalities who provided any answer to that question. In some cases, it is the percent of municipalities in a region and in other cases, the percent of municipalities in a population group.

"Percent of population" is used similarly. It is based on the population of those municipalities responding "yes" to a question as a percent of the population of those municipalities who provided any answer to that question.

In all cases, the total number of municipalities and total size of the population refers to the survey sample, not to Canada as a whole. It should be noted also that due to rounding, the percents do not always sum to exactly 100.

In general, it is interesting to compare the results between "percent of municipalities" and "percent of population." A considerable variation between these two percents on a given measure indicates that large and small municipalities are responding differently. For example, a higher percent of municipalities than percent of population indicates that smaller municipalities are scoring higher on that measure than larger municipalities. Conversely, a higher percent of population than percent of municipalities indicates that larger municipalities are the greatest contributor to that measure.

The values shown for the percent of population measure are affected strongly by the responses of the large cities (population group E, over 90,000 population). Although all the large cities were included in the survey mailing, only about 60% of them responded and were included in the analyses. It is possible that the inclusion of just one or two other large cities in any of the regions would have resulted in a different pattern of results. This caution is especially warranted in Quebec, which had the smallest number of municipalities in the survey sample.

A further note of caution is warranted in relation to recycling and composting results in this survey. Although most municipal recycling programs are in the early stages of development, municipalities reporting the collection of even one type of material for any portion of their population are categorized in

this survey as a "recycling municipality." Similarly, municipalities reporting any level of composting are categorized as a "composting municipality." For these reasons, the percent of municipalities and percent of population measures overstate, to some extent, the amount of recycling and composting that is actually occurring. It should be noted, however, that this overstatement applies more to the current situation than it does to situation that is expected in the near future. Fully developed recycling and composting program can be expected to have a greater impact on the amount of waste needing disposal than do the present immature programs.

## 2.2 Waste Management Methods

Survey respondents identified their waste management system as a method which used landfill, recycling, composting, incineration, or any combination of these four approaches. Because of the very small number of municipalities that used the methods of "landfill + composting" and "landfill + incineration + composting," these two methods have been combined in the presentation of the results.

### 2.2.1 Methods Used

Figure 1 shows the overall percent of use of each of these methods by the municipalities in the survey sample. Similarly, Figure 2 shows the percent of population for each method. While most municipalities (36%) used "landfill only", in terms of population, the most favoured method was the combination of landfill, recycling and incineration. This result indicates that recycling and incineration tended to be used more frequently in large municipalities.

The second highest method for municipalities was "landfill + recycling." This method was also second highest and tied with "landfill + recycling + composting" in the percent of population measure. Composting was the least used method when measured either by percent of municipalities or percent of population. It only demonstrated a sizeable effect in the combination "landfill + recycling + composting."

Figure 3 shows the breakdown of methods for each region. There is no one pattern of use of methods common across the regions. The highest percents for any one method (e.g., approaching 80%) are found in Quebec for "landfill + recycling + incineration" and in the Prairies for "landfill + recycling." "Landfill only" is the dominant method in the Atlantic Region while in Ontario "landfill + recycling + composting" is strongest. The Pacific Region shares Quebec's emphasis on "landfill + recycling + incineration" but at a much lower level with "landfill + recycling" playing a stronger role there than in Quebec. "Landfill only" is very low in Ontario.

### 2.2.2 Recycling and Incineration Combinations

In order to pull out the overall use of recycling and incineration, all methods that included each of these were combined to produce overall recycling and overall incineration percents. Figures 4 and 5 show these values for the percent of municipalities and the percent of population, respectively, for each region.

Using these combined measures, recycling is clearly stronger for the population than for the municipality data (with the exception of the Atlantic Region), indicating a large-city emphasis on recycling. A similar large-city effect can be seen for incineration in Quebec and to a smaller extent in Ontario and the Pacific Region. The opposite result, that is, more incineration in small municipalities, was found in the Atlantic Region and the Prairies. These incineration differences among the regions are likely due to the different types of incineration processes used (see Section 2.6 below).

These combined measures show a very strong emphasis in Ontario on recycling in terms both of municipalities (77%) and population (98%). (See, however, the cautionary note in Section 2.1.) Except for Quebec, all other regions also have a stronger emphasis on recycling than on incineration for both the municipalities and population measures. In terms of population, in the Atlantic Region, the recycling value is about seven times higher than the incineration value. In Ontario, recycling is three times higher; in the Prairies, 21 times; and in the Pacific Region, almost two times.

In the country as a whole, the population measure for incineration is only half as large as that for recycling. This one-half figure is somewhat reduced when measured by the percent of municipalities. As indicated earlier, this type of difference indicates that larger municipalites, in contrast to smaller municipalities, are putting more emphasis on recycling than on incineration.

## 2.3 Types and Amounts of Waste

Although a number of municipalities were able to provide fairly detailed information on the volume of waste being handled by their various waste management methods, in many other cases no or only a few items of data were provided. Overall, the amount of data was insufficient to conduct analyses on this category.

## 2.4 Recycling System Description

Data from the 55 municipalities that provided detailed information in this category is summarized in Tables 4, 5, and 6 and in Figures 6 and 7. The data in Table 4 and Figure 6 indicate that household curbside recycling was the dominant method in the Atlantic Region, Ontario, and the Prairies. Depots were dominant in Quebec and the Pacific Region. In Quebec neither apartment curbside or

commercial/industrial recycling were reported. In Ontario and the Prairies commercial/industrial recycling was least dominant.

Depots were least dominant in the Atlantic Region, and apartment curbside recycling, in the Pacific Region. As shown in Table 5 and Figure 7, except for Population Group D (where depots were dominant), household curbside recycling was the most frequently used method by all sized population groups. Somewhat surprising was the high level (67%) in the smallest sized population group for commercial/industrial recycling. This finding may be an anomaly of the data base since there were only three municipalities in Population Group A that reported detailed recycling information.

No linear trends across the population groups can be noted in any of the four recycling categories. This result probably indicates a general reaching out towards all types of recycling in municipalities of all sizes. This conclusion is supported by the many survey comments on "early stage," "under development," etc. in relation to recycling programs.

Table 6 summarizes the types of materials recycled in each region as a percent of municipalities. In general, the typical first four types (i.e., newspapers, glass, aluminum cans, and steel cans) dominate in the municipal programs. Scrap metal in all regions except Ontario was also a fairly high category, while PET and white goods (large appliances) were high in Ontario. Other materials given emphasis were corrugated cardboard in the Atlantic Region and Quebec, fine paper and other plastics in Quebec, and batteries in the Prairies. Some of the figures in this table may be somewhat distorted due to the role of long-standing private sector activities in areas such as scrap metal and batteries that may not have been included in the survey data.

## 2.5 Composting System Description

Composting is a new method for municipal solid waste disposal that is beginning to generate considerable interest in some areas. Table 7 summarizes information on backyard and centralized composting programs. Only Ontario and the Prairies report actual programs for backyard composting, with the Ontario program approaching the half-way point on the population measure.

All regions reported centralized programs with the greatest emphasis on these programs in Quebec and Ontario. All of the centralized programs in this survey sample collected leaves. Only in Ontario were other materials, such as household organic waste collected. This latter type of program is under consideration or in pilot stage development in several other municipalities.

## 2.6 Incineration System Description

Incineration was reported as a system component in 28% of the

municipalities and 41% of the population. Detailed information (see Table 8) was available for all municipalities with incineration.

When all forms of incineration are considered, the percent of population measure ranged from 4% in the Prairies to 80% in Quebec. Open burn was not reported in Quebec or Ontario, but was reported, respectively, by 17%, 38%, and 73% of municipalities using incineration in the Pacific Region, the Atlantic Region and the Prairies.

Energy recovery was limited to Quebec, Ontario, and the Pacific Region, except for one incinerator in the Atlantic Region. In all cases except Ontario (where electricity and heat were also recovered), the form of energy recovery was steam.

Except for one incinerator each in the Atlantic and Pacific Regions, the only regions with emission control of any type were Quebec and Ontario.

In summary, Quebec and Ontario, and to a smaller extent the Pacific Region, typically recovered energy and used some form of emission control. Open or dump face burning was more common in the Atlantic Region and the Prairies. These differences in approach to incineration probably are the basis for the large-small municipality differences for incineration noted earlier in the discussion of methods.

## 2.7 Landfill System Description

Landfill information was obtained from almost all municipalities (103 or 91% of the survey sample). Table 9 summarizes this information. Leachate management was relatively rare, being found in only 22% of the 103 municipalities. Leachate management ranged from a low of 8% of municipalities in the Prairies to 50% in Ontario. In the survey sample, gas management was found even less frequently with only 5 landfills reporting an active burning system, 2 a venting system, and none recovering energy from the gas.

The issue of remaining landfill capacity was addressed in two ways: the percent of the population served by landfill that would be exhausted at specific future dates, and the average number of years of landfill life remaining per person in each region. Both measures point to limited landfill reserve capacity given the typical number of years required to get a new site selected, approved, and operational.

Figure 8 shows the remaining landfill capacity for the entire survey sample as a percent of the population that will experience exhausted landfill capacity in specified years. In only two years, 22% of the population will be facing exhausted capacity. Unless

new landfills come on line, by approximately 1995, a total of 71% of the population will have exhausted its landfill capacity. Only 16% of the population is served by landfills expected to last longer than 2010.

For the years up to 1995, these population percent figures are larger than the municipal percent figures shown in Table 10 indicating that large cities are under greater stress from diminishing landfill capacity than are smaller municipalities.

The regional breakdown in terms of the percent of municipalities is summarized in Table 10. Quebec appears to be in the most precarious situation with 100% of the capacity of municipalities in the survey sample exhausted by 1995. Ontario and the Prairies are under somewhat less stress with 63% and 66%, respectively, of their capacity exhausted by 1995. However, if only the earliest time period is considered (1992), the Prairies are experiencing the most stress with 62% of its municipalities facing exhausted capacity in only two years. The Pacific Region is in the best shape with 63% of its capacity not being exhausted until 2000 or later.

The second measure of remaining landfill capacity was a rough approximation of the number of remaining years per person in each region. This measure is described and the results shown in Table 11. These data confirm the preceding discussion with the Pacific Region in the best state with an average of 13 years remaining per person. Ontario and the Atlantic Region come second with 10 and 9 years, respectively. The Prairies have an average of 7 years, while Quebec is facing an average of only 4 remaining years per person.

These rough estimates do not reflect the diversity of pressure, or lack of pressure, facing individual municipalities, but they are another indication of the urgency of addressing solid waste management issues. Even the Pacific Region is not in an enviable position because of the long time period for bringing new landfill sites into use.

## 2.8 Future Planning

Many municipalities expressed optimism about the changing nature of their waste management systems and their future ability to meet their management responsibilities by devising new systems composed of a number of different elements. The major options under consideration and the percent of municipalities looking at each option are shown in Figure 9 and Tables 12 and 13.

### 2.8.1 Options Under Consideration

Figure 9 summarizes the percent of municipalities in all regions considering each option. Recycling, both Household and

Commercial/Industrial, was the option most frequently under consideration, while export was considered least frequently. Household Reduction, which may reflect, at least in part, a growing understanding of packaging issues, was also considered a strong option. The two composting options also showed considerable strength, particularly Centralized Composting.

The Commercial/Industrial Waste Exchange option showed only moderate strength, but was stronger than the low level for Energy From Waste. The concept of landfills as unrestricted disposal sites was also quite low and only about one-third that for landfills as restricted disposal sites.

Tables 12 and 13 contain a breakdown of options by region and by population group, respectively. As shown in Table 12, the most favoured option in all regions except Ontario was Household Recycling. In Ontario, Household Reduction held the top position, with Backyard Composting second. Commercial/Industrial Recycling held second place in the Atlantic Region, Quebec (tied with EFW and Restricted Use Landfill), and the Prairies. In the Pacific Region, Centralized Composting was in second place followed by Commercial/Industrial Recycling in third place. In general, Export was the least favoured option in all regions followed by Unrestricted Use Landfill.

When the options are considered in terms of different population groups (Table 13), Household Recycling is again in first place, although in the Population Group C municipalities it is tied with Household Reduction. There is more variability across the population groups for the position of the other options. In the two smaller-sized groups, Population Groups A and B, more highly favoured options include Commercial/Industrial Recycling and Restricted Use Landfill with an additional emphasis in Population Group A on Household Reduction and in Population Group B on Household Reduction and Centralized Composting. Not surprisingly for small municipalities, relatively unfavoured options include Commercial/Industrial Waste Exchange, Export, and EFW.

For Population Group E (large-sized municipalities), a greater number of options are favoured. These include, in order, Household Recycling, Household Reduction, Centralized Composting, Commercial/Industrial Reduction, Backyard Composting, Commercial/Industrial Waste Exchange, Household Reuse, and Restricted Use Landfill. Least favoured by the E group, were Export and Unrestricted Use Landfill. EFW was at a relatively low level.

Population Group C municipalities favoured, in order, Household Reduction, Household Recycling, Commercial/Industrial Recycling, Restricted Use Landfill, Commercial/Industrial Reduction, and Backyard Composting. Least favoured were Export, Unrestricted Use Landfill, and Commercial/Industrial Waste Exchange. Population

Group D municipalities favoured, in order, Household Recycling, Commercial/Industrial Recycling, Household Reduction, Backyard Composting, and Centralized Composting. Least favoured were Export, Unrestricted Use Landfill, and Commercial/Industrial Waste Exchange.

### 2.8.2 Waste Management Hierarchy

The "Hierarchy" question addressed the possible use of a system for combining these options into an overall plan. Table 14 describes the usual hierarchy and shows the percent of municipalities and percent of population in each region where a hierarchy is used in the planning process. Ontario and Quebec are utilizing this tool in 41% and 18% of their municipalities and 60% and 89% of their population, respectively. In the Pacific Region, only 10% of the municipalities and 5% of the population are served by the hierarchy approach. In this survey sample, none of the municipalities in the Atlantic Region or the Prairies used the hierarchy.

The response to the hierarchy question is supported by the highly varied responses across the regions and population groups to the options question. If the hierarchy were a well-established principle, that is, if reduction was considered first, reuse second, and so on, the option data probably would have shown a different pattern.

### 2.8.3 Waste Reduction Targets

Waste reduction targets are another approach being used by some municipalities to reduce their disposal needs. Table 15 shows that the percent of municipalites with waste reduction targets ranges from 5% in the Prairies to 54% in Ontario. The actual municipalities and their targets show a highly variable range of reduction percents and years. The most common goal appears to be 50% reduction by 2000. the most ambitious goals are 50% by 1990 in Lac du Bonnett, Manitoba (population 1,021) and 40% by 1992 in Guelph, Ontario (population 160,000).

### 2.8.4 Waste Management Plan

Figures 10 and 11 depict the percent of municipalities and percent of population in each region currently operating under a plan or currently involved in preparing a future plan. It should be noted in examining these figures, that some municipalites with a current plan may not yet need to be involved in a future planning process.

A glance at Figures 10 and 11 reveals expanding planning activity for the future. The most startling regional data in these figures is Quebec moving from no plan now to 91% and 98%, respectively, of municipalities and population working on a future plan. The Atlantic Region shows a similar, although less pronounced, shift. In Ontario, the shift is even less pronounced. The reverse

situation can be seen in the larger cities in the Prairies, where more of the population is served by a current plan than by preparations for a future plan. The same reversal is seen in the Pacific Region where both the municipal and population data show more present plan operation than future planning.

### 2.8.5 Parties Involved in the Planning Process

Table 16 summarizes the diverse nature of the parties involved in the future planning process. Note that responses by the municipalities included all parties involved at each stage, not just the dominant party.

Drafting plans appears to be done primarily by consultants and municipal staff with some help from staff of the provincial ministry and from municipal councils. There is a relatively small amount of public involvement at this stage typically.

Providing the rationale is carried out primarily by municipal staff with help from consultants, the provincial ministry staff, the public, and to a lesser extent municipal councils. Recommendations are made by, in order of weight, municipal staff, consultants, provincial ministry, public, and municipal councils.

Final decisions are made primarily by municipal councils, with some help from the provincial ministry, provincial cabinet, and hearing boards.

Information on the degree of public involvement in the different regions is shown in Table 17 for percent of municipalities and percent of population. In terms of percent of municipalities, the Atlantic Region and Ontario have the most public involvement and Quebec the least. For percent of population, the Atlantic Region and Quebec have the most and the Prairies the least. The difference in the two types of measures indicates there is more public involvement in large cities than in small ones in all regions except the Prairies. This difference is most pronounced in Quebec.

## 3.0 CONCLUSIONS

Solid waste management practices in Canada are in a dynamic period of growth and change. Municipalities which had traditionally been following the relatively simple practices of collection and burn or bury are now faced with a number of choices that involve quite different patterns of behaviour. It is not unexpected that at this early stage of evolution of these practices, a wide range of options are under consideration or are at various stages of development.

Information on capacity remaining at existing landfill sites indicates that, on the average, it is rapidly becoming exhausted

all across the country. Unless new sites come on line, 71% of the landfill capacity will have been exhausted by about 1995. This urgent pressure for more landfill space is being felt most strongly in Quebec, the Prairies, and Ontario.

Present methods of management emphasize landfill, recycling, and incineration. Composting is still operating at a quite low level although considerable interest is being expressed towards pursuing this option in the future. Use of the landfill only option is most common in the smaller municipalities. Larger municipalities tend to use landfill plus recycling, recycling and incineration, or recycling and composting.

Regional analyses indicate that the Atlantic Region depends most strongly on landfill, Quebec on landfill plus recycling and incineration, Ontario on landfill plus recycling and composting or landfill plus recycling and incineration, the Prairies on landfill plus recycling, and the Pacific Region on landfill plus recycling and incineration or landfill plus recycling.

When all methods that have a recycling component are combined, recycling is seen more strongly in large than in small municipalities and in Ontario than in other regions. The recycling combination as a percent of the population is very strong in all regions with even the lowest region (Atlantic) at 48%.

The combination of all methods with incineration reveal a strong effect only in Quebec.

The types of recycling operations indicate a very strong preference for Household Curbside in all regions except Quebec, where depots are dominant.

The strongest waste management options under consideration for the future are Household Recycling and Commercial/Industrial Recycling. The next strongest level is Household Reduction, Centralized Composting, and Restricted Use Landfill. The options least considered are Export, Unrestricted Use Landfill, and EFW.

A very active future planning process is underway all across the country. Typically, the future plans are being drafted by consultants and municipal staff, with the rationale provided by them plus the provincial ministry and the public. Recommendations are made by these four parties plus municipal councils. Final decisions are made by municipal councils with help from the provincial ministry, provincial cabinet and hearing boards.

Many interesting comments were included in the returned surveys. As waste management practices evolve, the dominant role of local municipalities appears to be changing. A large number of municipalities reported that future plans were being carried out and operations designed to be used on a regional basis. Others

spoke of the need to involve provincial and federal levels in order to utilize some of the newer options in a strong manner. Still others spoke of the need for future systems to take into account the realities of specific situations, especially those of small, remote communities. These ideas and others are captured in the following selected quotations.

St. John's, Newfoundland

"We expect to be partners in 1990 regarding the making of a regional waste management plan."

Trenton, Nova Scotia

(In relation to the Hierarchy) "At the present time, we are in the process of modernizing our complete operation."

Cote Saint-Luc, Quebec

"26 Island of Montreal municipalities have banded together and formed the 'Regie intermunicipale de gestion des dechets sur l'ile de Montreal.. .' to handle 600,000 tonnes of waste a year and serve a total population of roughly 650,000."

Guelph, Ontario

"Municipalities can and will get 50% out of the waste stream. However, it will be meaningless if the Provincial and Federal Governments do not change the societal infrastructure sufficiently to absorb this new concept."

Mississauga, Ontario

"1. At the Federal and Provincial levels more attention must be given to establishing and maintaining end markets for recyclables and to providing legislation to handle overpackaging."

"2. At the Provincial and Municipal levels, purchasing policies need to be established to buy products made from recycled materials, i.e., papers, plastics."

"3. Clearer, more helpful and less restrictive guidelines from MOE (the provincial ministry of the environment) for municipal R & D and pilot projects. More funding."

"4. Legislation re use of recycled paper for daily and weekly newspapers."

Winnipeg, Manitoba

"Factors that may affect the current waste management system or policies include proposed provincial legislation regarding waste minimization, proposed city policies regarding waste minimization and proposed changes to the provincial waste disposal grounds regulation."

Saskatoon, Saskatchewan

"A comprehensive approach to solid waste management will be considered by the city. Realizing that the producer of the waste has a responsibility to reduce, the first approach will

be to educate the consumer to eliminate the waste."

Hay River, N.W.T.
"Car bodies are a major concern as the price of scrap metal would not cover the costs to haul them out."

Gold River, British Columbia
"Legislation continues to demand more and more controls. We agree with a clean environment. But the cost is put on the property owner. Therein is the biggest problem."

Prince George, British Columbia
"For low population density areas, remote from markets, recycle priorities should be realistically assessed with emphasis on such items as vehicles, batteries, tires, paper products. Collection points should be at the sources of the products, such as large shopping centres for paper products where sorting and baling can be carried out before the material enters the waste stream. Household recycling may not be practical in remote areas because of the cost of transportation to market."

Table 1 Regions, Population Groups and Abbreviations

**Regions**

Atlantic (AT)
- New Brunswick
- Newfoundland
- Novia Scotia
- Prince Edward Island

Quebec (PQ)
Ontario (ON)
Prairies (PR)
- Alberta
- Manitoba
- Northwest Territory
- Saskatchewan

Pacific (PA)
- British Columbia
- Yukon Territory

**Population Groups**

| | |
|---|---|
| A | Less than 2000 |
| B | 2000 - 9,999 |
| C | 10,000 - 29,999 |
| D | 30,000 - 90,000 |
| E | over 90,000 |

**Abbreviations**

EFW = energy from waste
mun. = municipalities
n.a. = not available
N or no. = number
pop. = population
prov. = provincial

Table 2 Return Rate of Surveys by Region

| Region | Number Mailed | Number Returned | Percent Returned |
|---|---|---|---|
| Atlantic | 43 | 20 | 47% |
| Quebec | 31 | 11 | 35 |
| Ontario | 43 | 22 | 51 |
| Prairies | 74 | 39 | 53 |
| Pacific | 33 | 21 | 64 |
| Total | 224 | 113 | 50 |

Table 3 Survey Sample by Region and Population Group

| | Population Group | | | | | |
|---|---|---|---|---|---|---|
| Region | A | B | C | D | E | All |
| Atlantic | 2 | 9 | 3 | 4 | 2 | 20 |
| Quebec | 0 | 1 | 5 | 2 | 3 | 11 |
| Ontario | 2 | 3 | 4 | 3 | 10 | 22 |
| Prairies | 10 | 16 | 7 | 4 | 2 | 39 |
| Pacific | 2 | 5 | 4 | 7 | 3 | 21 |
| All | 16 | 34 | 23 | 20 | 20 | 113 |

Table 4 Recycling Methods by Regions

Based on data from 55 municipalities that reported this item.

| | | % of Municipalities Using Each Method | | | |
|---|---|---|---|---|---|
| Region | No. of Mun.* | Household Curbside | Apartment Curbside | Depots | Commercial Industrial |
| AT | 10 | 70 | 50 | 40 | 60 |
| PQ | 2 | 50 | 0 | 100 | 0 |
| ON | 17 | 100 | 53 | 35 | 24 |
| PR | 15 | 67 | 33 | 47 | 27 |
| PA | 11 | 58 | 17 | 82 | 25 |

* Refers to the number of municipalities that reported recycling programs in the survey sample.

Table 5 Recycling Methods by Population Groups

Based on data from 55 municipalities that reported this item.

| | | % of Municipalities Using Each Method | | | |
|---|---|---|---|---|---|
| Region | No. of Mun.* | Household Curbside | Apartment Curbside | Depots | Commercial Industrial |
| A | 3 | 100 | 33 | 0 | 67 |
| B | 11 | 82 | 54 | 27 | 0 |
| C | 11 | 64 | 27 | 54 | 45 |
| D | 13 | 54 | 31 | 69 | 54 |
| E | 17 | 94 | 41 | 59 | 18 |
| All | 55 | 76 | 38 | 51 | 31 |

* Refers to the number of municipalities that reported recycling programs in the survey sample.

Table 6 Materials Recycled

Based on data from the 53 municipalities that reported this item. Not included in these 53 municipalities, or in the data below, are recycling efforts by private individuals that were occasionally mentioned in the survey sample. These 53 municipalities represent 96% of the municipalities with a recycling program.

| Material Recycled | % of Mun. Recycling Each Type of Material | | | | |
|---|---|---|---|---|---|
| | AT | PQ | ON | PR | PA |
| Newspaper | 60 | 100 | 100 | 67 | 100 |
| Glass | 60 | 50 | 94 | 47 | 82 |
| Aluminum Cans | 70 | 50 | 100 | 80 | 73 |
| Steel Cans | 30 | 50 | 100 | 20 | 64 |
| PET | 20 | 0 | 88 | 20 | 27 |
| White Goods * | 20 | 0 | 35 | 33 | 18 |
| Scrap Metal | 60 | 50 | 29 | 53 | 45 |
| Batteries | 30 | 0 | 18 | 40 | 27 |
| Tires | 0 | 0 | 18 | 20 | 9 |
| Corrugated Cardboard | 50 | 50 | 6 | 0 | 27 |
| Oil | 0 | 0 | 0 | 7 | 27 |
| Fine Paper | 0 | 50 | 6 | 7 | 9 |
| Other Plastics | 20 | 50 | 12 | 0 | 18 |

* large appliances

Note that for those municipalities (N = 26) where information was provided on the Stage 1 processing of recycled materials (e.g., sorting and baling), 33% of the municipalities in the Atlantic Region and 43% in the Ontario Region were operating under a guaranteed market agreement. No guaranteed market agreements were indicated in the other three regions.

Table 7 COMPOSTING PROGRAMS

Based on data from 93 municipalities that reported this item.

| Region | Percent of Pop. Backyard | Centralized |
|---|---|---|
| Atlantic | 0% | 24% |
| Quebec | 0 | 80 |
| Ontario | 42 | 62 |
| Prairies | 4 | 4 |
| Pacific | 0 | 1 |

| Region | For Centralized Programs No. of Mun. | With: Leaf | Household | Other |
|---|---|---|---|---|
| Atlantic | 2 | 2 | 0 | 0 |
| Quebec | 2 | 2 | 0 | 0 |
| Ontario | 9 | 9 | 2 | 2 |
| Prairies | 1 | 1 | 0 | 0 |
| Pacific | 1 | 1 | 0 | 0 |

## Table 8 INCINERATION

Based on data from the 87 municipalities that reported this item. Some form of incineration was used in 32 municipalities, or 37% of those reporting this item. These 32 municipalities represent 28% of all municipalities and 41% of the total population in the survey sample.

For each variable below, "no. of mun." refers to the number of municipalities that reported "yes" for that variable. "% of Reg. Pop." refers to the percent of the total regional population represented by that population of those municipalities reporting "yes." "% of Inc. Mun." is the percent that "yes" municipalities is of the 32 incinerating municipalities. "% of Inc. Pop." is the percent that the population of "yes" municipalities is of the population of the 32 incinerating municipalities.

| Incineration Variable | AT | PQ | ON | PR | PA |
|---|---|---|---|---|---|
| Incineration Any Type | | | | | |
| No. of Mun. | 8 | 3 | 4 | 11 | 6 |
| % of Reg. Pop. | 7 | 80 | 29 | 4 | 41 |
| Open Burn | | | | | |
| No. of Mun. | 3 | 0 | 0 | 8 | 1 |
| % of Inc. Mun. | 38 | 0 | 0 | 73 | 17 |
| % of Reg. Pop. | 3 | 0 | 0 | 3 | 4 |
| % of Inc. Pop. | 50 | 0 | 0 | 75 | 1 |
| Energy Recovery | | | | | |
| No. of Mun. | 1 | 3 | 3 | 0 | 5 |
| % of Inc. Mun. | 12 | 100 | 75 | 0 | 83 |
| % of Reg. Pop. | <1 | 80 | 29 | 0 | 41 |
| % of Inc. Pop. | 5 | 100 | 99 | 0 | 99 |
| Type of Energy Recovery | | | | | |
| No. electricity | 0 | 0 | 3 | 0 | 0 |
| No. heat | 0 | 0 | 1 | 0 | 0 |
| No. steam | 1 | 3 | 2 | 0 | 5 |
| Emission Control Any Type | | | | | |
| No. of Mun. | 1 | 3 | 3 | 0 | 1 |
| % of Inc. Mun. | 12 | 100 | 75 | 0 | 17 |

Table 9 LANDFILL MANAGEMENT

Based on data from the 103 municipalities that reported this item.

| Region | No. of Mun. | Leachate Mgt. * | | Gas Mgt. ** | | |
|---|---|---|---|---|---|---|
| | | No. of Mun. | % of Mun. | Vent | Burn | EFW |
| Atlantic | 17 | 3 | 18% | 1 | 1 | 0 |
| Quebec | 9 | 4 | 44 | 0 | 3 | 0 |
| Ontario | 20 | 10 | 50 | 1 | 0 | 0 |
| Prairies | 39 | 3 | 8 | 0 | 0 | 0 |
| Pacific | 18 | 3 | 17 | 0 | 1 | 0 |

* Any type of active leachate management (e.g., trucked or piped to sewer, or recirculated through the landfill). Does not include passive management, such as a clay base.

** Gas management refers to the number of municipalities that reported these types of management.

Table 10 Remaining Landfill Capacity

Based on data from 71 municipalities (63% of the survey sample) that reported this item.

| Region | Percent of Municipalities Year Capacity Exhausted: | | | | |
|---|---|---|---|---|---|
| | 1992 | 1995 | 2000 | 2010 | >2010 |
| Atlantic | <1 | 46 | 9 | 43 | 1 |
| Quebec | <1 | 100 | 0 | 0 | 0 |
| Ontario | 36 | 27 | 2 | 1 | 33 |
| Prairies | 62 | 4 | 1 | 21 | 12 |
| Pacific | 2 | 35 | 11 | 22 | 30 |
| All | 20 | 21 | 10 | 24 | 25 |

Table 11 Population-adjusted Landfill Capacity Remaining in Years

Based on data from 71 municipalities. The years shown below are rough estimates only. Municipalities were divided into groups depending on what year their landfill would be exhausted. For these groups, one year capacity was assumed to remain for landfills running out in 1990, 1991, or 1992; four years, for those running out in 1993, 1994, or 1995; eight years, for 1996 to 2000; 15 years for 2001 to 2010; and 25 years, for landfills estimated to last longer than 2010. The "year" estimate for each region was derived by multiplying the population in each of the above capacity categories by the year assumption for that category, summing these values for all capacity categories, and dividing by the total population used in these calculations.

| Region | Years |
|---|---|
| Atlantic | 9 |
| Quebec | 4 |
| Ontario | 10 |
| Prairies | 7 |
| Pacific | 13 |
| All | 8 |

## Table 12 FUTURE PLANNING

### WASTE MANAGEMENT OPTIONS UNDER CONSIDERATION - REGIONS

Based on data from 66 municipalities that reported this item. These 66 municipalities represent 58% of the municipalities in the survey sample. The table below shows the municipalities in each region considering each option as a percent of those municipalities reporting option information.

| | Percent of Municipalities | | | | | |
|---|---|---|---|---|---|---|
| | Region: | | | | | |
| Option | AT | PQ | ON | PR | PA | All |
| Household | | | | | | |
| Reduction | 38 | 25 | 94 | 50 | 50 | 56 |
| Reuse | 54 | 12 | 47 | 21 | 29 | 35 |
| Recycling | 85 | 80 | 82 | 86 | 86 | 85 |
| Commercial/Industrial | | | | | | |
| Reduction | 46 | 38 | 53 | 36 | 36 | 42 |
| Waste Exchange | 23 | 25 | 41 | 29 | 21 | 29 |
| Recycling | 77 | 50 | 70 | 64 | 57 | 65 |
| Composting | | | | | | |
| Backyard | 15 | 12 | 88 | 36 | 50 | 45 |
| Centralized | 38 | 38 | 76 | 29 | 64 | 52 |
| Export | 8 | 0 | 18 | 7 | 0 | 8 |
| EFW | 31 | 50 | 29 | 7 | 21 | 26 |
| Landfill | | | | | | |
| Restricted Use | 54 | 50 | 53 | 57 | 29 | 48 |
| Unrestricted Use | 15 | 0 | 24 | 21 | 14 | 17 |

## Table 13 FUTURE PLANNING

### WASTE MANAGEMENT OPTIONS UNDER CONSIDERATION - POPULATION GROUPS

Based on data from 66 municipalities that reported this item. These 66 municipalities represent 58% of the municipalities in the survey sample. The table below shows the municipalities in each population group considering each option as a percent of those municipalities reporting option information.

| | Percent of Municipalities | | | | |
|---|---|---|---|---|---|
| | Population Group: | | | | |
| | A | B | C | D | E |
| Household | | | | | |
| Reduction | 40 | 42 | 58 | 44 | 79 |
| Reuse | 20 | 33 | 25 | 28 | 53 |
| Recycling | 100 | 100 | 58 | 84 | 89 |
| Commercial/Industrial | | | | | |
| Reduction | 20 | 25 | 42 | 32 | 72 |
| Waste Exchange | 0 | 17 | 17 | 17 | 63 |
| Recycling | 80 | 58 | 50 | 67 | 74 |
| Composting | | | | | |
| Backyard | 20 | 33 | 42 | 39 | 68 |
| Centralized | 20 | 42 | 25 | 36 | 79 |
| Export | 0 | 8 | 17 | 0 | 11 |
| EFW | 0 | 25 | 8 | 32 | 39 |
| Landfill | | | | | |
| Restricted Use | 60 | 58 | 50 | 33 | 42 |
| Unrestricted Use | 40 | 17 | 17 | 11 | 16 |

## Table 14 FUTURE PLANNING: HIERARCHY

### Planning Processes Being Developed Within a Hierarchy of Waste Management Options

Based on data from the 95 municipalities that reported this item. A hierarchy was being used by 13 municipalities, or 14% of those reporting this item. Almost all hierarcharies reported were the same as or minor variants of the following, with the exception of Mississauga, Ontario, which placed landfill before energy recovery:

1. Reduction
2. Reuse
3. Recycling
4. Material Recovery
5. Energy Recovery
6. Landfill

| Region | % of Mun. | % of Pop. |
|---|---|---|
| Atlantic | 0 | 0 |
| Quebec | 18 | 89 |
| Ontario | 41 | 60 |
| Prairies | 0 | 0 |
| Pacific | 10 | 5 |
| All | 12 | n.a. |

## Table 15 WASTE REDUCTION TARGETS

### Municipalities Reporting Waste Reduction Targets

Based on data from 91 municipalities that reported this item. One or more targets had been set by 24 municipalities, or 26% of those reporting on this item.

| Region | No. of Mun. | % of Mun. |
|---|---|---|
| Atlantic | 2 | 10% |
| Quebec | 2 | 18 |
| Ontario | 12 | 54 |
| Prairies | 2 | 5 |
| Pacific | 7 | 33 |

### Actual Waste Reduction Targets

| Municipality | Date | Percent | Date | Percent |
|---|---|---|---|---|
| Atlantic Region | | | | |
| Halifax, NS | 1994 | 25% | | |
| Queens, NS | 1991 | 12 | 1992 | 22% |
| Quebec | | | | |
| Ville de Laval | 1995 | 15 | 1999 | 25 |
| Ville de Montreal | 2000 | 50 | | |
| Ontario | | | | |
| Barrie | 2000 | 50 | | |
| Brampton | details not available | | | |
| Cornwall | 1996 | 25 | 2000 | 50 |
| East Gwillimbury | 1989 | 10-15 | 1990 | 20 |
| Glanbrook | 1993 | 25 | | |
| Grimsby | 1992 | 25 | | |
| Guelph | 1992 | 40 | 2000 | 50 |
| Halton Reg. | 1996 | 25 | 2000 | 50 |
| Hamilton-Went. Reg. | 1998 | 30 | | |
| Mississauga | 1986 | 10 | | |
| Windsor | 2015 | 40 | | |
| York Reg. | 1995 | 25 | 2011 | 50 |
| Prairies | | | | |
| Athabasca, AB | 1990 | 5 | 1991 | 10 |
| Lac du Bonnet, MB | 1990 | 50 | | |
| Pacific | | | | |
| Burnaby, BC | 1991 | 30 | | |
| Cntr. Kootenay Reg.BC | 1991 | 15 | 1993 | 30 |
| Gold River, BC | 1990 | 2 | | |

## Table 16 PARTIES IN THE PLANNING PROCESS

Based on data from the 61 municipalities that reported this item. The numbers in this table represent the percent of these municipalities using the indicated parties at each of the four planning stages.

| | Percent of Municipalities | | | |
|---|---|---|---|---|
| | Planning Process Involvement: | | | |
| Parties | Draft Plan | Provide Rationale | Make Recommendations | Make Decisions |
| Public | 13 | 36 | 39 | 8 |
| Municipal Staff | 61 | 74 | 67 | 10 |
| Consultants | 66 | 44 | 52 | 6 |
| Prov. Ministry | 26 | 38 | 46 | 21 |
| Municipal Council | 20 | 28 | 38 | 80 |
| Hearing Board | 5 | 6 | 11 | 18 |
| Prov. Cabinet | 8 | 5 | 8 | 21 |
| Other | 15 | 13 | 13 | 11 |

## Table 17 PUBLIC INVOLVEMENT

### Planning Processes Being Developed With a Public Hearing or Pre-hearing Public Participation

Based on data from the 50 municipalities that reported this item. Some form of public involvement was used by 38 municipalities, or 76% of those reporting on this item.

| Region | % of Mun. | % of Pop. |
|---|---|---|
| Atlantic | 55 | 91 |
| Quebec | 18 | 89 |
| Ontario | 45 | 56 |
| Prairies | 20 | 9 |
| Pacific | 33 | 52 |
| All | 34 | n.a. |

Fig. 1

# Waste Management Methods

## Percent of Municipalities

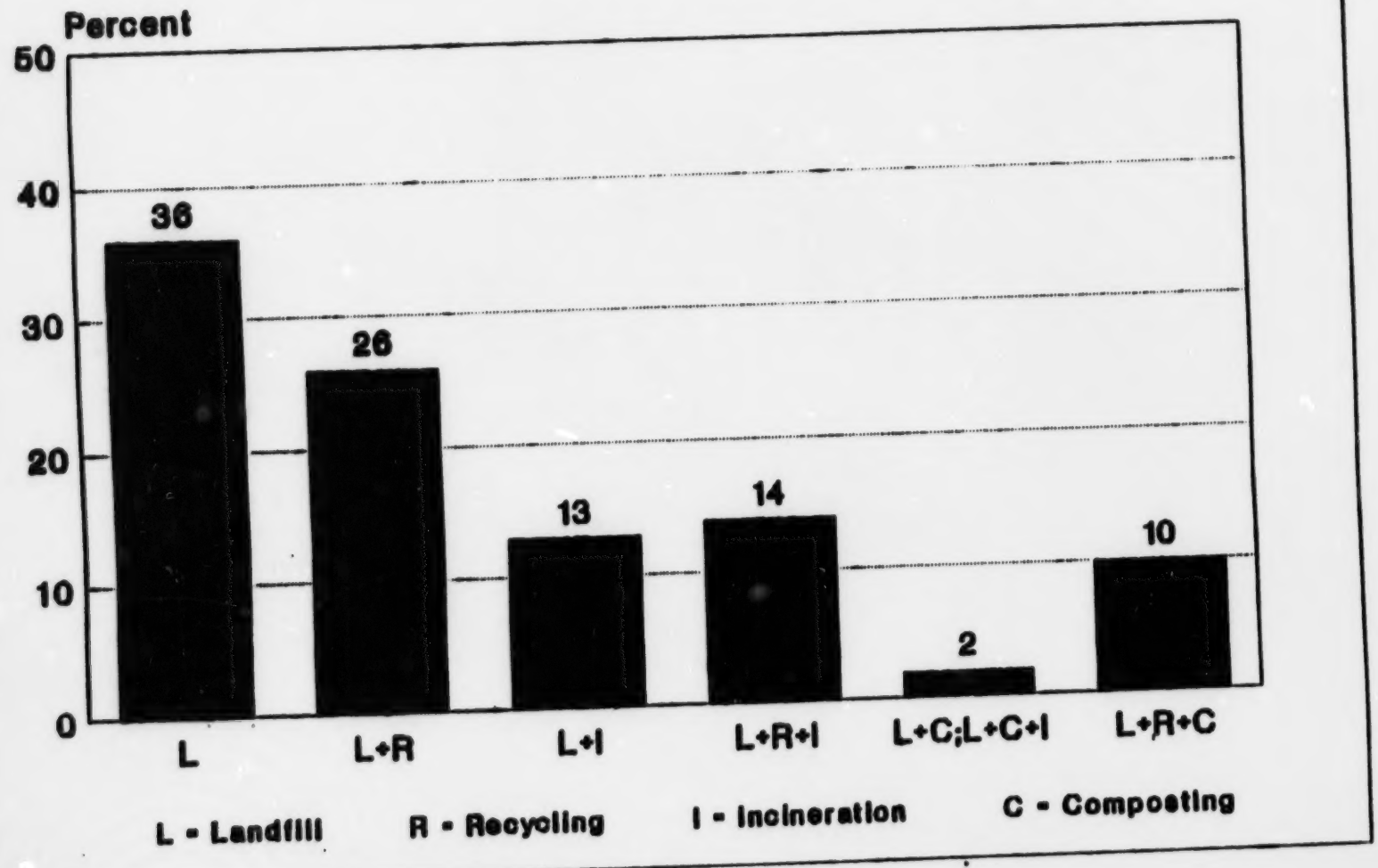


Fig. 2

# Waste Management Methods

## Percent of Population

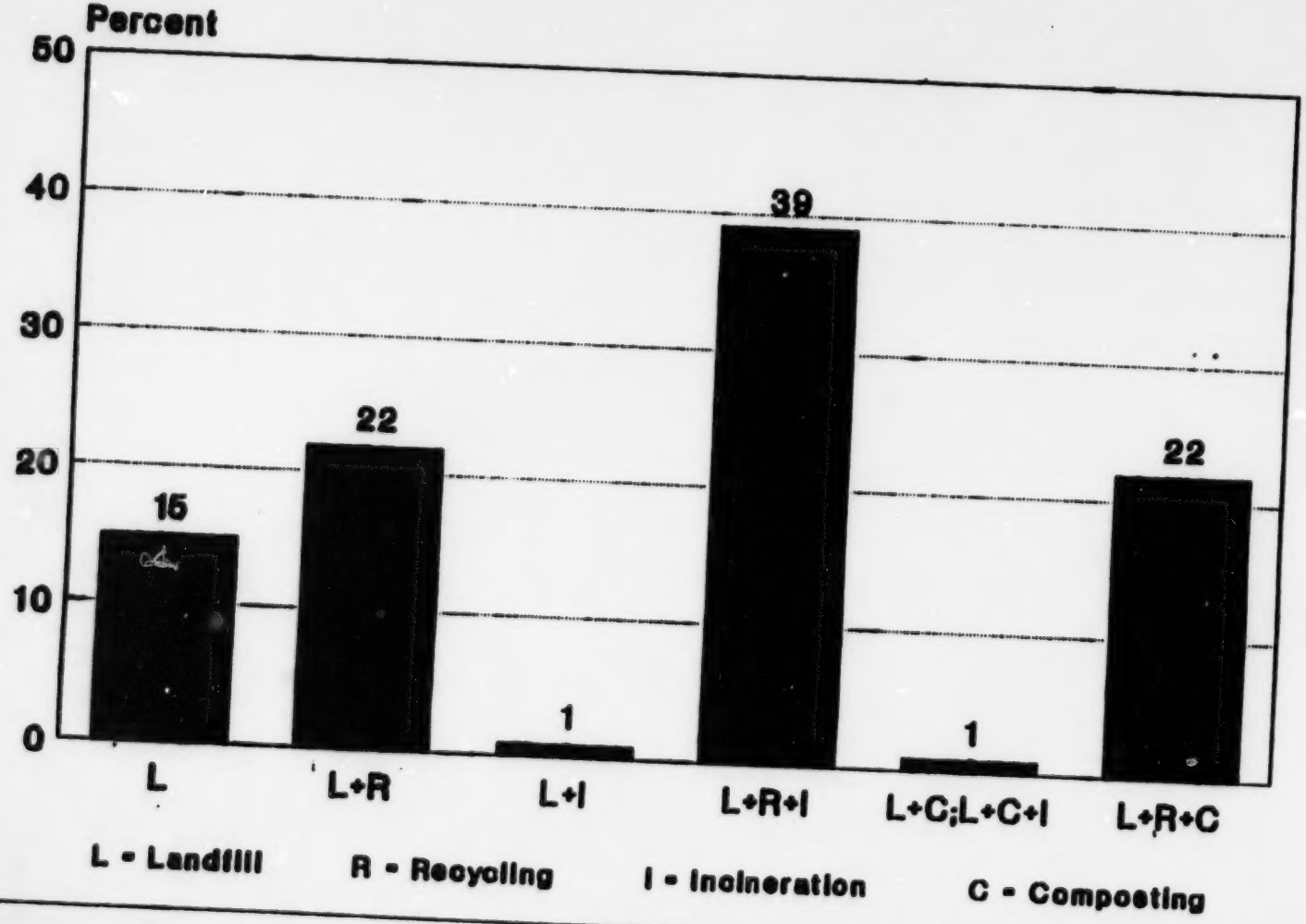


Fig.3

# Waste Management Methods

## Percent of Population/Region

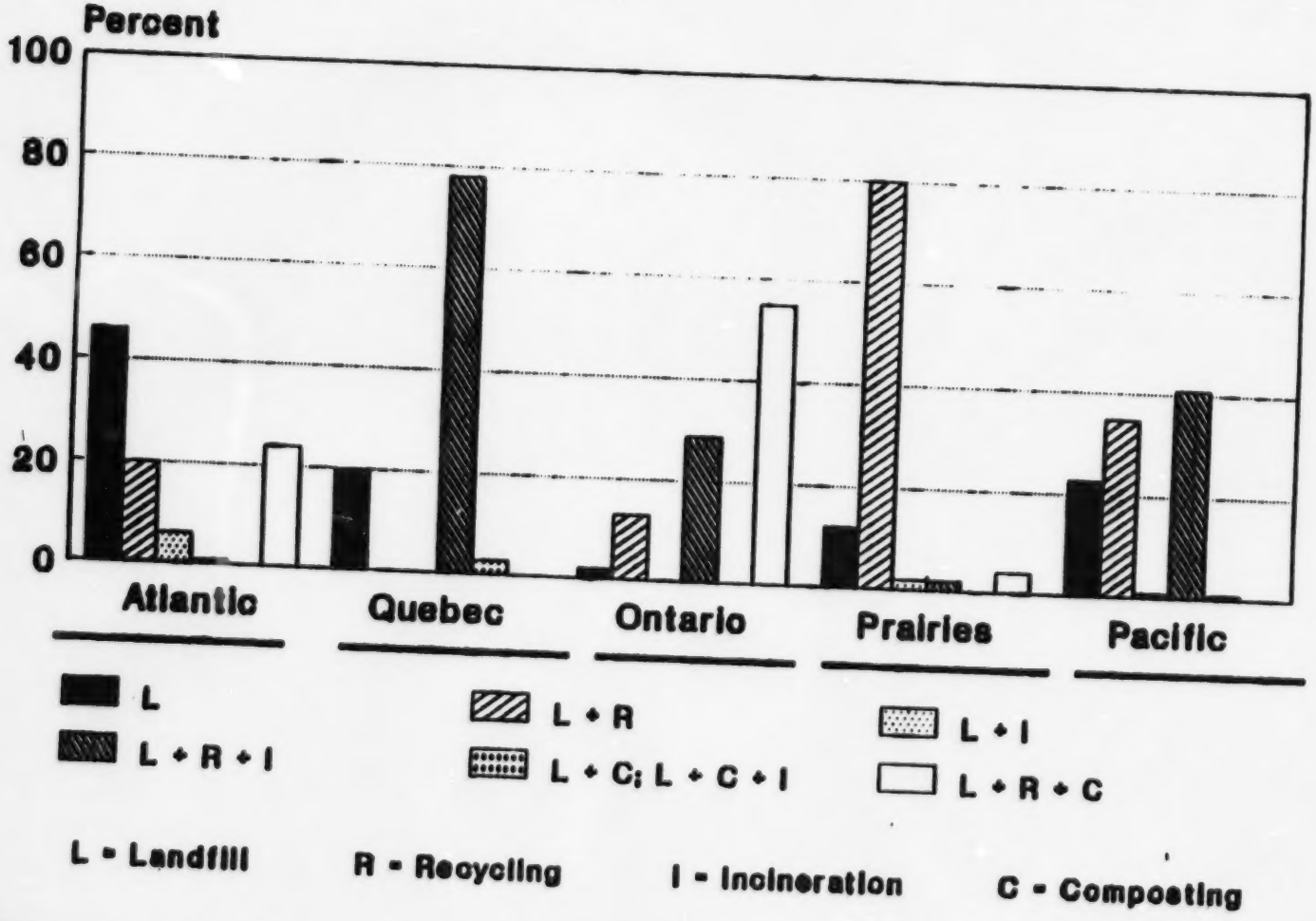


Fig. 4

# Recycling/Incineration Methods
## Percent of Municipalities

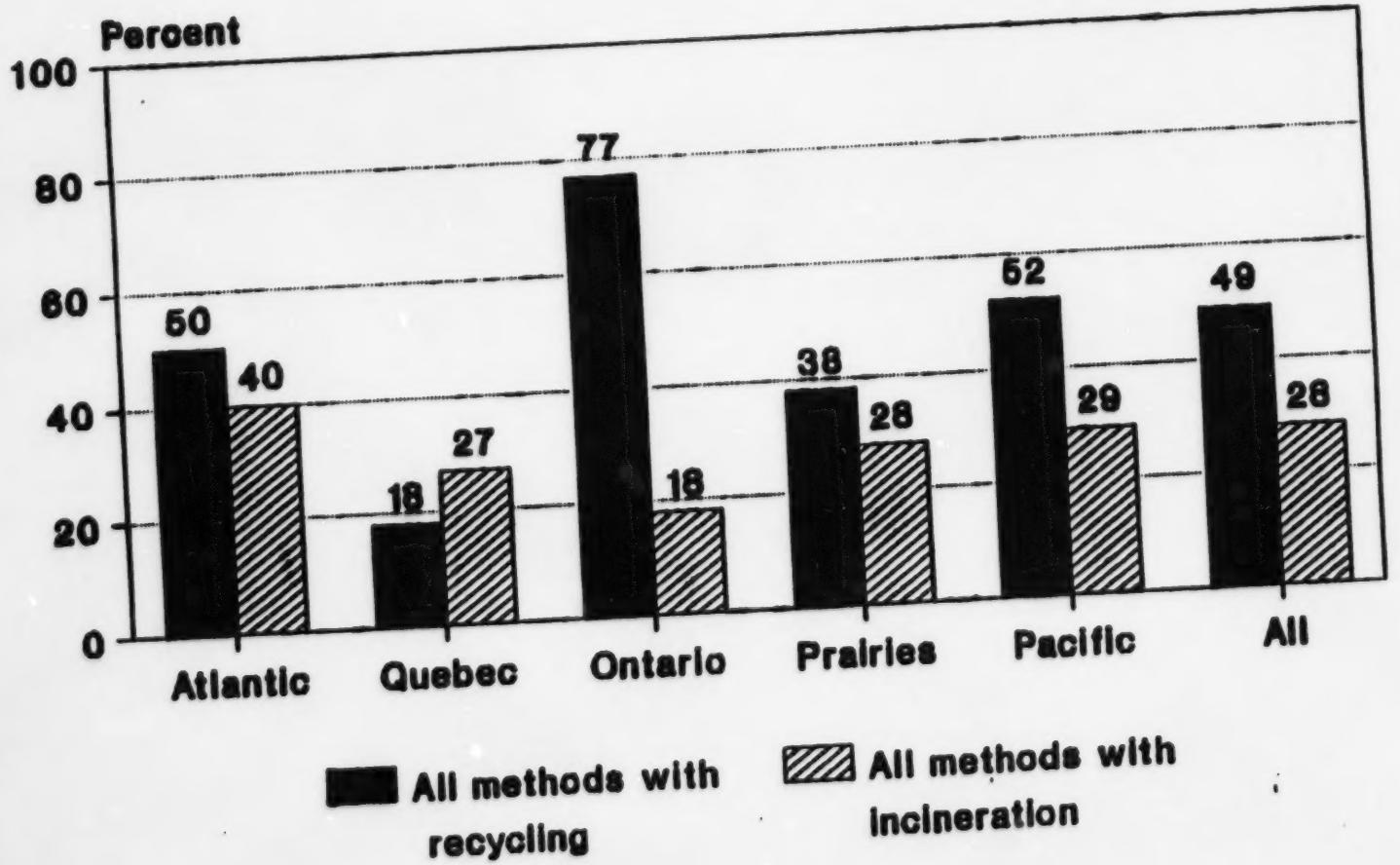


Fig. 5

# Recycling/Incineration Methods

## Percent of Population

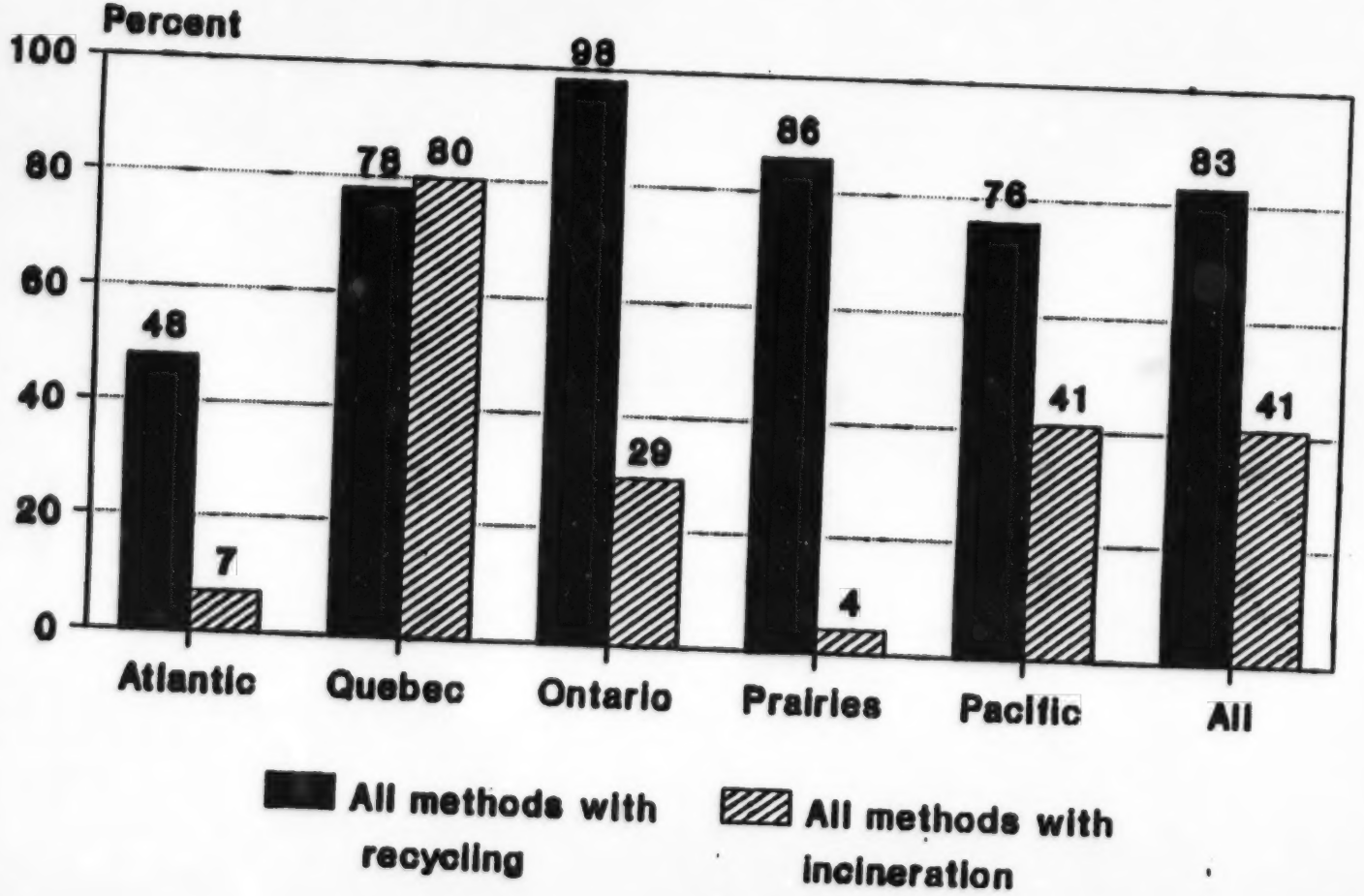


Fig. 6

# Recycling Methods
## Regional Use of Methods

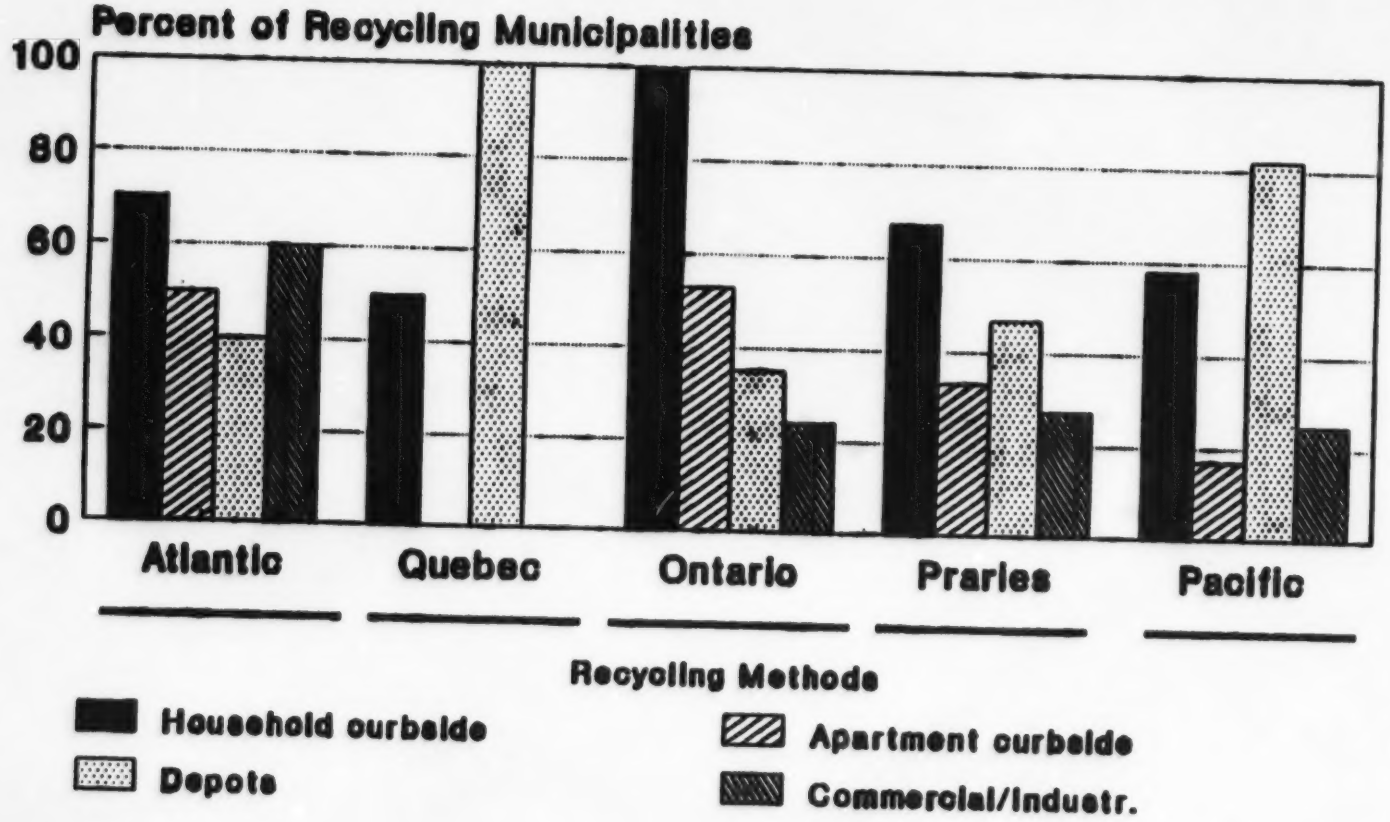


Fig. 7

# Recycling Methods
## Population Groups Use of Methods

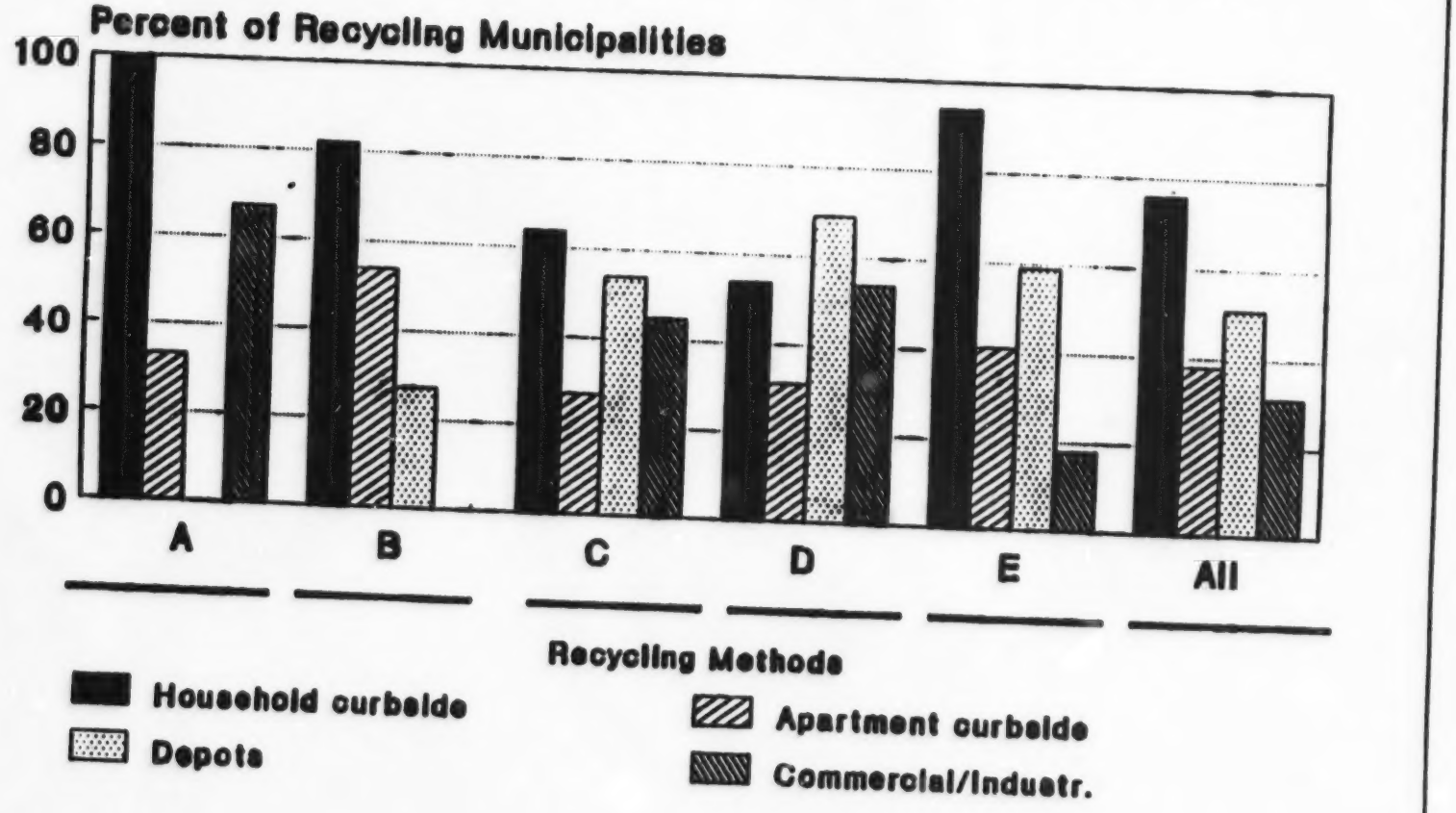
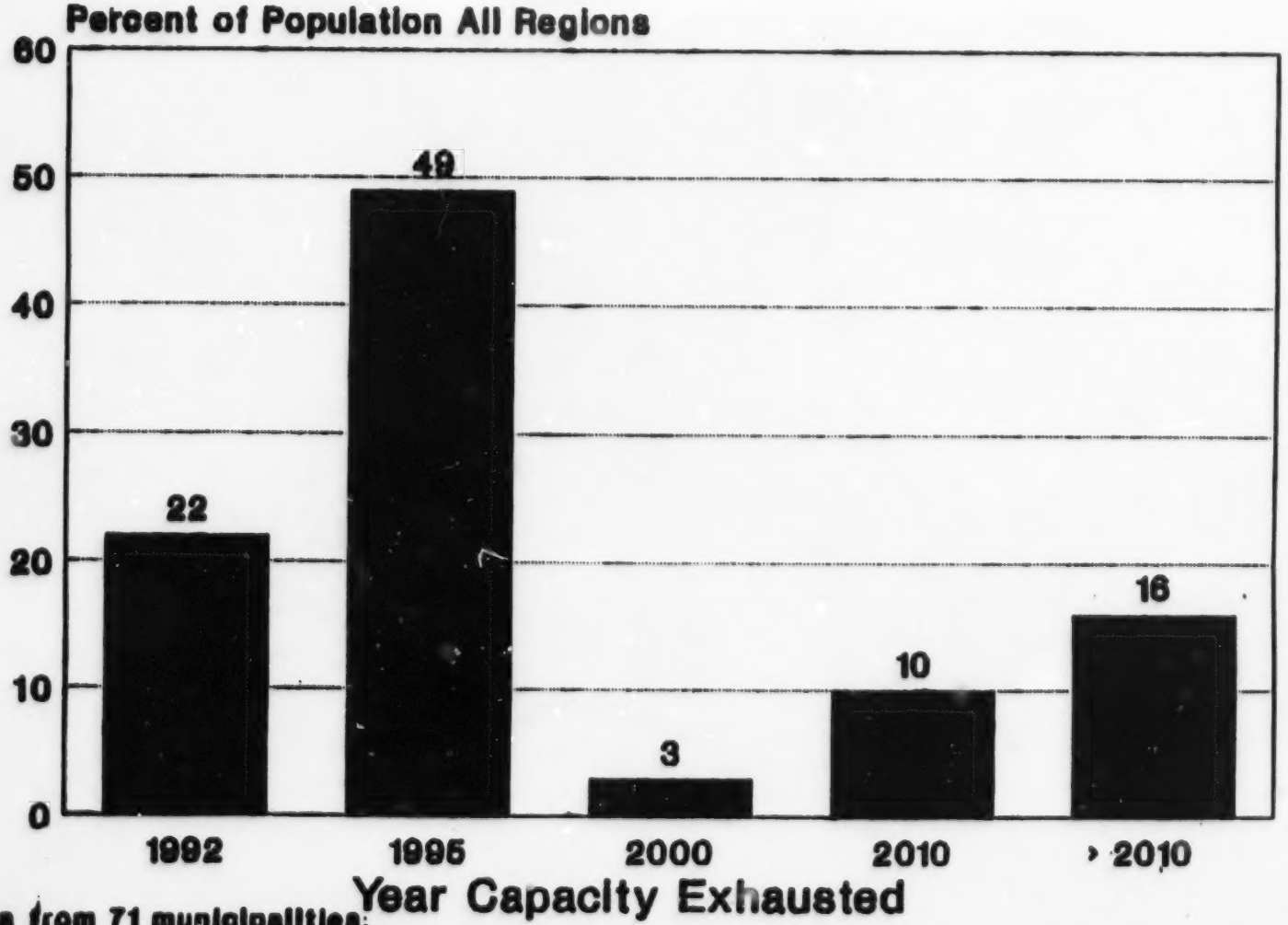


Fig. 8

# Remaining Landfill Capacity




Data from 71 municipalities.

Fig. 9

# Future Options
## All Regions

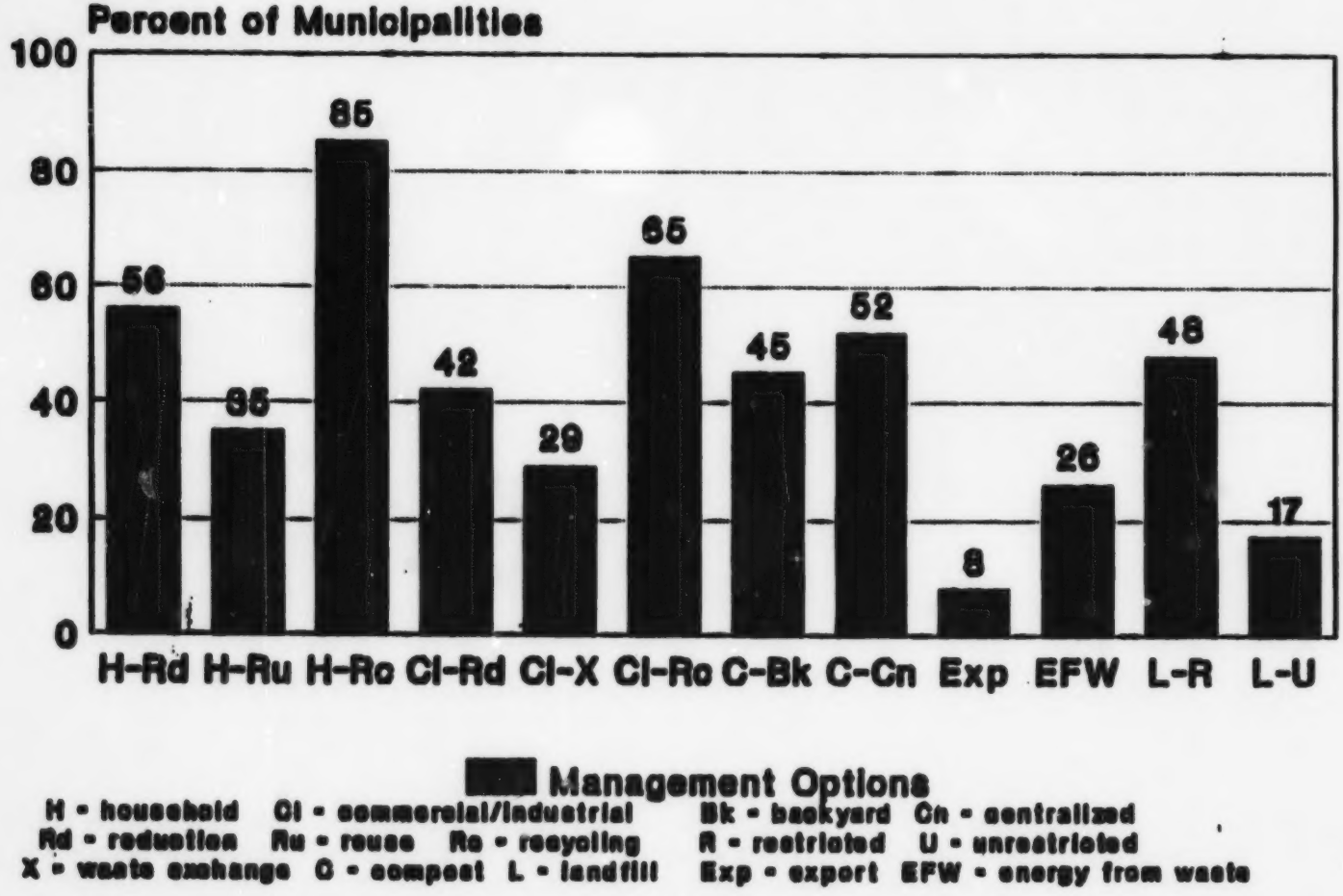


Fig. 10

# Operating Under A Plan

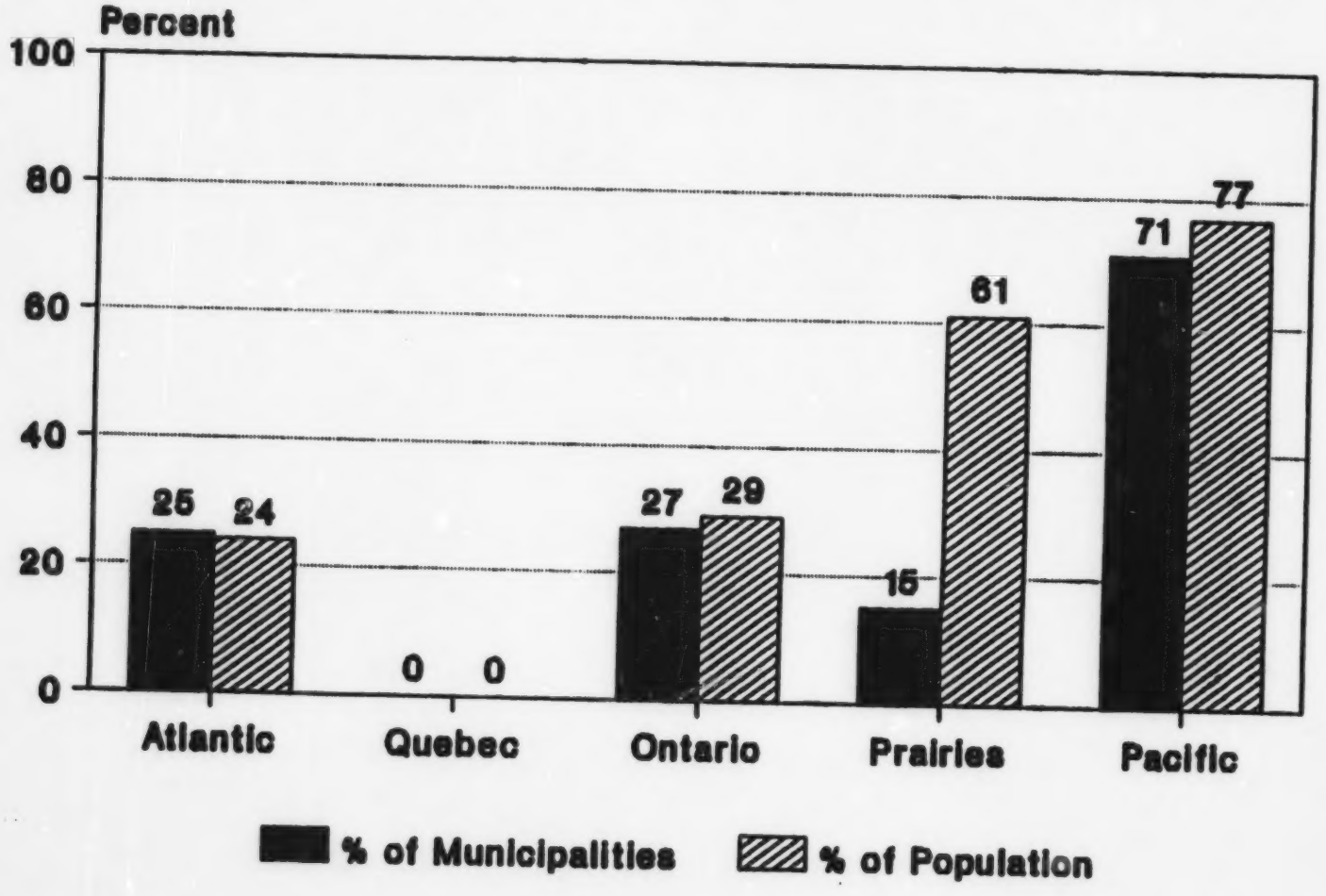
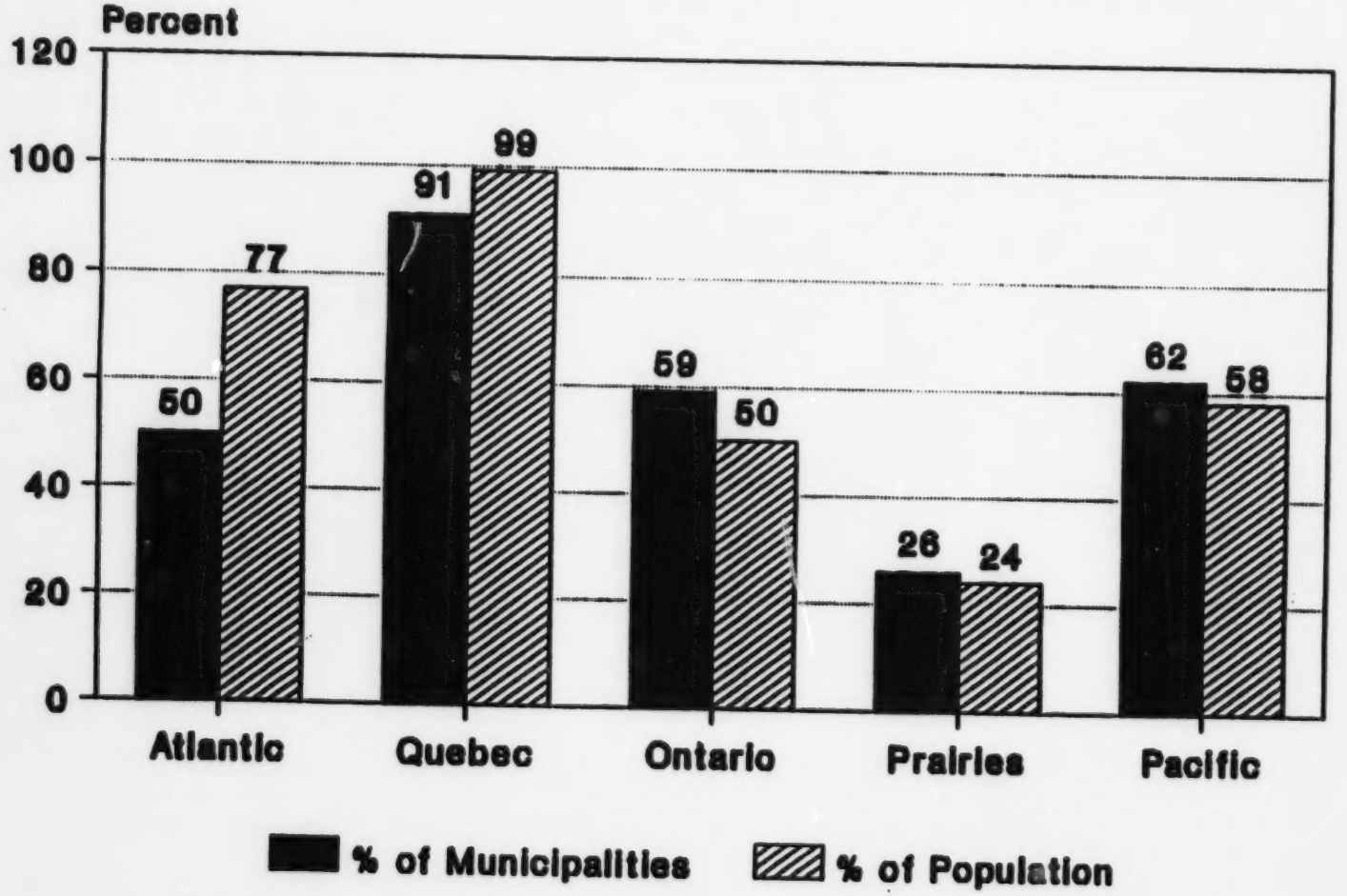


Fig. 11

# Preparing Future Plan



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